SUPPLEMENT.

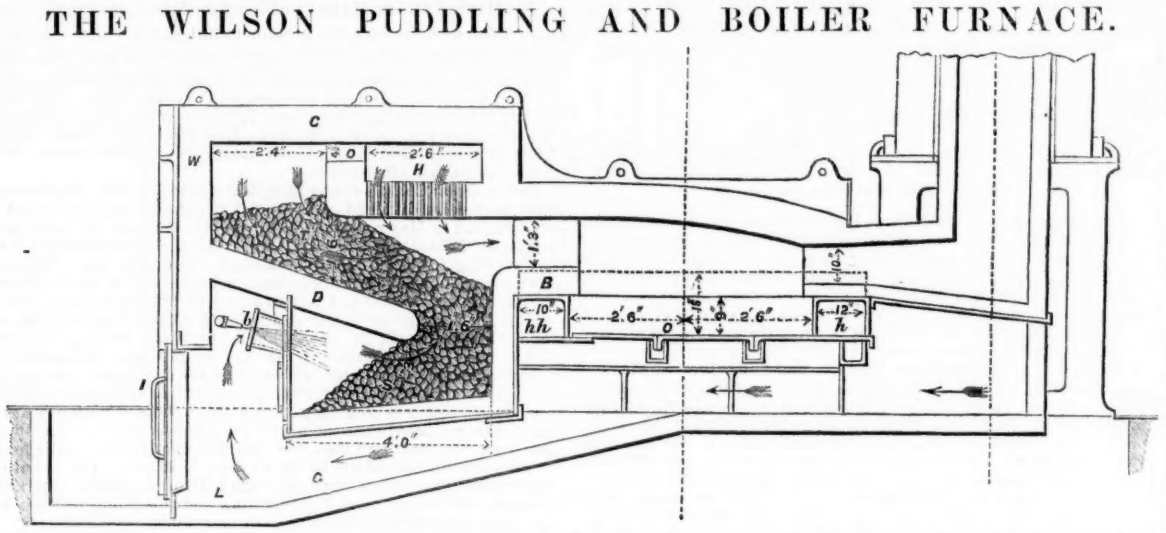
The Mining Journal,

RAILWAY AND COMMERCIAL GAZETTE:

FORMING A COMPLETE RECORD OF THE PROCEEDINGS OF ALL PUBLIC COMPANIES.

No. 1727.—Vol. XXXVIII. LONDON, SATURDAY, SEPTEMBER 26, 1868. { STAMPED .. SIXPENCE. UNSTAMPED, FIVEPENCE.

THE WILSON PUDDLING AND BOILER FURNACE.



Since our last notice of this furnace, Mr. WILSON has continued his exertions to make it the most absolute success, and we think that we are now justified in saying that such is the case. As it will be recollected, the puddlers fought most determinedly against its introduction at the Milton Iron Works, and Mr. Dawes allowed them to beat him, though he repeatedly asserted, by letters published at the time, that he was determined to carry the furnace through despite all opposition. As we constantly pointed out, the furnace gave admirable results, saving much fuel, improving the iron, &c., but the alterations required were a little costly.

Mr. John Jones, the able secretary of the Iron Trade Association in the North of England, read a paper at the meeting of the British Association for the Advancement of Science at Norwich on the Economical Manufacture of Iron. He there states that, according to information he has gathered, the furnace is being adopted in the Cleveland district, and that the saving of fuel is 20 to 25 per cent., that the consumption is 1,500,000 tons of coals per annum in the production of our finished iron, and that the subject is one of national importance. This paper was followed by one by Mr. Siemens, F.R.S., the well-known eminent inventor of the gas-furnace, in which he gives some very interesting details of the working of a puddling-furnace on his system, justly claiming extraordinary merit therefor, on account of it producing a larger quantity of iron than the ordinary system of furnace permits. Mr. Cowper stated that, in his opinion, one great cause of the superior yield, as also quality of the iron, was that the great heat of Mr. Siemens' furnace caused it to run more freely from the cinder than was possible in an ordinary furnace.

With these preliminary remarks, we will now go more into detail. Messrs. Wm. Whitwell and Co., Thornaby Iron Works, Stockton-on-Tees, so well known for their energy, enterprise, and determination to hold a first rank in the Cleveland iron trade, put up their first furnace in January this year; it was very successful, but it had grate-bars at the bottom, partly to meet the prejudices of the men, and to overcome them. In the month of March Mr. Wilson persuaded them to allow him to put up a furnace without bars, which he did. Forthwith the success was positive, all difficulties had completely vanished. For a little time minor points of construction had to be met; but for some time every furnace was put up exactly like its neighbour, and at this moment nearly all the furnaces at the above works are on Mr. Wilson's system. Several of the works in the district have trial furnaces at work, the results fully bearing out those of Messrs. Whitwell.

At a trial made by Messrs. Hopkins, Gilkes, and Co. (Limited) (week 6th to 11th July inclusive) the coals used were 17 cwts. 1 qr. 22 lbs. to the ton of puddled bar; the yield of iron in excess. Another experiment (week ending Aug. 22) the coals used were 16¾ cwts. to the ton; 1¼ ton of fettling saved—iron charged, 13 tons 16 cwts. 3 qrs. 13 lbs.; iron drawn, 12 tons 18 cwts. 0 qr. 16 lbs.: loss, 18 cwts. 2 qrs. 27 lbs. Messrs. Richardson, Johnson, and Co., North Yorkshire Iron Works, Stockton, furnish a return (Aug. 31), coals, 18 cwts. to the ton of iron; yield, 13 lbs. average per heat in excess of ordinary furnace. Messrs. Whitwell and Co. are charging all their patent furnaces 4¾ cwts. per heat, and they find very little loss of iron; the quality is in all cases superior. We think that these statements justify us in saying that the ironmasters have an opportunity of saving a large amount of money in the manufacture of iron, and we trust such an invention will not be allowed to languish and struggle into notoriety by slow degrees, as most of our inventions have to, no matter how great their benefit to the public.

We will now point out the improvements in the furnace. Air is forced into the flue-bridge by a steam-jet; it passes into a conduit at the back of the furnace, thence into the flame-bridge, and up into a chamber, where it arrives red-hot; it thence passes down into and on to the incandescent fuel. By this arrangement much fettling is saved, being the cause of a great economy. Mr. Siemens states that his furnace used an extra quantity of fettling, which reduced the benefit of his good yield of iron. But to obviate this, he adopted water-bridges (these are much used); they absorb much heat from the furnace—this gentleman states equal to 8 or 10 lbs. of coals per heat. We think this a low estimate, as the getting up has to be taken into account. However, it is obvious that by the arrangement described above the heat abstracted by the circulating current of air is restored to the furnace; this forms an important feature in the improvement. The fuel is fed at the highest point of the furnace by a side door on the standing, and there are proper arrangements for shoring up when required also on the standing. A current or currents of air are also forced in below into a closed chamber, by which the cinders are most completely burnt up. The steam being decomposed passing through the incandescent fuel, transfers the intense heat into the working chamber. The quantity of refuse produced is very small. The clinkers are readily removed with a light hook, and the men are never occupied more than a few minutes in the operation, generally one minute. Thus, we are justified in saying this is perfect combustion; it appears to us there is no room for further improvement. But to restore the waste heat into the generator, furnaces are now being put up by Messrs. Hannah and Sons, under the superintendence of their manager, Mr. Badon, formerly of Jarrow, where pretty nearly all the heat will be regenerated. These furnaces can go to any intensity, and the flame is under perfect control to oxydise or not; or the iron may be drenched with intensely hot air. The cost of alteration to existing furnaces is very small; when erecting new ones about the same price. The advantages obtained are no smoke, no cinders, a large yield of iron, and better in quality. If we assume 25 cwts. of coals used as the Cleveland average for puddling, it appears to be about 8 cwts. to the ton saved. Much fettling is saved, there are less repairs, and no grate-bars to replace. We think there is sufficient inducement to ask its adoption.

Original Correspondence.

SPECIAL EDUCATION FOR WORKING MEN.

SIR,—If I were fully to notice all that is reported from day to day bearing with interest upon the relations of working men to their employers, I could hardly do justice to the subject were I to fill half the columns of your paper. This detailed examination, however, is less necessary, seeing that all tell the same story, further illustrating, first on one side then on the other, the evils of the present system of Unionism, and the pressing want of such Unions of masters and of workmen in good understanding with each other, as it the object of these letters to advocate. The extracts given in the *Times* from the evidence of ironmasters and manufacturers before the Commission deserve careful attention, especially now when a larger portion of orders for machinery and ironwork generally is daily sent hence to the Continent, and we are so frequently under-bidden in our best foreign markets. It is clear we shall lose much of our best business—it may be feared for ever—unless masters and men lose no time in pulling together with a will to remove every hindrance to our keeping the lead we have so long taken in the world's markets.

I remarked awhile back that the United States, in their go-ahead fashion, seemed destined to work out for us this labour question by pushing things to an extremity, and pointing out to us by example what to do and what to avoid. An extract from an American paper has just turned up unexpectedly illustrating this. At a sessions in Westminster county, State of New York, some men have been committed for intimidation and conspiracy to drive non-Union men from the workshops. Our working men may learn from this example that even in what is called the land of freedom there are extremes in these proceedings which cannot be tolerated. Before the International Working Men's Congress, noticed in my last letter, separated there was some reaction from the extreme absurdities they began with, and most of the worst follies proposed were reasoned down and out-voted. Therefore this progress, though so far but of a negative kind, warrants the hope I expressed, that as their meetings go on they may, if their association continues, advance to something like good sense, and really benefit the working classes. They seem, even before it is tried on anything like an extensive scale, to have a sort of inkling that co-operation, if successful, will only be another form of the power of capital, and, therefore, denounce as not legitimate the successful co-operative trading companies in Lancashire and Yorkshire, mainly, as far as I can see, because they are too prosperous, and make profits. It is clear that a very short trial of co-operation, if ever they get to try it, will convince these men that if it succeeds at all it can only be by neglecting their absurd theories, and doing business just in the track of the masters they seek to replace.

We have discussed the necessity of general education for working men no less than for the trading and professional classes of society. Hardly, if at all, less needful in these days of general competition is that special education which teaches them the elementary principles on which are founded the operations of their daily work, of whatever kind. This is the more needful the higher their rank amongst the great bodies of artificers and producers. To attain the summit of skill and success in all ornamental work, good art teaching is indispensable. For want of this teaching, many English workmen of real genius and love for their work fail in reaching the first place in invention and finish, which is reached by men noways their superior in any way, who have had good models before them, and been instructed in the principles on which their excellency is founded. Just as essential is some knowledge of physics and mechanics to all who have anything to do with construction and engineering; and of elementary chemistry for all who have to do with the smelting and reducing of metals, the use and production of dyes and chemicals, and many other applications of this science to manufactures. Nor are some branches of this knowledge, as well as of mineralogy, less useful to all who work in mines and quarries; for this knowledge not only contributes to excellence, confidence, and safety in work when the men come to understand something of the properties and dangers of the elements with which they daily have to deal, but gives the man who can think and reason on the causes of different results a brilliant chance now and then of making his fortune and benefiting his country, by some discovery which, for want of this knowledge, might have forever been hidden from him. The history of inventions shows what great results have often arisen from a sudden thought flashing upon a man in his daily work, perchance from some unusual combination. He might have been struck with an idea, even if wholly uninstructed save by what daily practice could teach him. But even if he pursued the train of thought it could only be by long and patient experiments, groping in the dark, ignorant alike of the causes of success and failure, until perchance he missed the prize he did not know he was within an ace of grasping. Whereas no such painful uncertain process is required by the trained mind of him who at once perceives the relations of what has struck him to what he seeks. He needs no experiments for most of the results which these relations explain in themselves, and knows how to test his fancied discovery in such a manner as will soon show him whether it is a success or not. Perhaps we shall never know how much has been lost, or long delayed, for want of this knowledge generally amongst working men, for to those of understanding daily work in many occupations is one long course of experiments, bringing us nearer to the nature of many things very imperfectly known, if known at all.

In England, unfortunately, the means of acquiring this kind of special education within the reach of the working classes are very irregular, scanty, and insufficient; hence the providing of this valuable instruction for the members of their trade is a very important part of the duties of all Trades Unions. Their unanimous, active support would render it the interest of schools to provide for this want, and the master to whom this branch of teaching was instructed might continue and supplement the special education of apprentices by weekly lectures to apprentices and journeymen, taking illustrations and examples mainly from the course of the daily work, which would add interest to his teaching, and insure its being thoroughly practical. Certificates of attendance on these lectures to be given to apprentices by the Education Committee of the Union, and required to be produced by them to avoid payment of such fines as would be inflicted for non-attendance; and periodical examinations would grant such rewards and privileges to the proficient as would rouse the emulation of all to strive for them.

The chief end and use of such special instruction is to enable the Trades Unions to discharge duties hitherto wholly neglected by them, but which, if they rightly understood their position, are far the most important points to which their attention can be directed. In former letters of this series it has been clearly and decidedly stated that the highest wages any trade can afford to pay can only be permanently secured by the highest class of work. So far from recognising this vital principle, Trades Unions have hitherto, in many of their regulations, attempted rather to bring all down to one average level, than to help the best workmen to secure the fair reward for their skill in increased earnings, and aid and stimulate the inferior to such improvement as would bring them continually nearer to the mark. Unless this suicidal policy is wholly changed, there is much danger of foreign competition thrusting the English workman aside from his highest place in the world's industry, and placing one who may be more competent there in his room. There are certain principles which operate, in the long run, with the undeviating certainty of laws of nature, against which neither Trades Unions nor any other modes of organisation have the slightest power to contend. As well might they attempt to reverse the laws of gravity, and force water to ascend instead of continually seeking a lower level, as strive to invade or destroy the monopoly of excellence. This monopoly is fenced and secured by laws of universal force and operation far more powerful than the edicts of the most absolute despot, because inherent in and depending upon the very essence and nature of all social intercourse. The only way by which the rewards of the highest skill can be obtained is by bringing the performance up to the required mark, and even surpassing this mark if possible. The old Trades Guilds, the members of which produced and have left us such marvellous proofs of their excellence in various branches of art and manufacture, were in this respect far wiser in their generation than the Trades Unions of this day. By examinations, rewards, and all the honours they could give to skill in every craft, they jealously guarded the excellence of the work for which any nation or place had acquired fame, so as to keep safe the monopoly such fame had earned. Preserving the spirit of their regulations for this purpose, our Trades Unions should so far modify them as to fit them for the wants of the present day.

And this is not less needful for the Trades Unions of masters than for those of men. Sorely has the character of English manufactures suffered from short measures, and making up goods of inferior quality in such form and style as to deceive the buyer, and look like the best goods, so unfairly simulated. To give one instance out of many, some Eastern markets have been wholly lost, because the cottons looking like the best native goods, and far cheaper, proved in wear loaded with size or lime, fading in colour and texture, dropping into holes, and worthless after a single washing. The masters' Unions should combine to denounce and prevent all such unworthy practices in all trades, and apply to the Board of Trade, or to Parliament, if needed, to protect them from fraudulent imitation, in the use of such a Union stamp or trade mark as would warrant the goodness and honesty of all articles sold by their members. This mark would soon be known, and relied upon in all the world's markets, and would prevent the loss of the prestige long deservedly enjoyed by English work, wares, and manufactures.

A few general remarks by way of summary will conclude this long

series of letters, in which I hope both employers and workmen have found something worthy of their consideration in these times of unsettlement and discussion of everything affecting the condition of the working classes.—*London, Sept.* 23. A MAN OF EXPERIENCE.

THE INTERNATIONAL CONGRESS OF WORKING MEN.

SIR,—I have read with great pleasure and instruction the letters of "A Man of Experience" on the labour question, in the *Mining Journal*. His remarks appear to me to be very temperate on both sides, and if we had more of such men, both in the councils of men and masters, we should get better results. The question of labour and education will ere long have worked themselves to the foremost rank, when they will have to be looked full in the face, and a reasonable solution, based upon justice, will have to be sought out. The incessant war between labour and capital will have to cease, else what is to become of our well-deserved prosperity? The International Congress of Working Men, now assembled, seems determined to adjust matters on their side. This Congress is, however, in its infant days as yet, and, like every other institution, it must increase its strength by experience. After reading the reports that have hitherto been issued, it appears to me that they look at the question too much from a working man's, and too little from a master's, point of view. No doubt it would be *vice versa* in a Congress of Masters. This is human nature; the master has not the working man's feelings and difficulties, neither has the working man got the master's feelings and difficulties. But how are we to get out of the difficulty at this rate? The great question that lies at the root of every other seems to be this. The master is bound to produce his material for a certain price, that price being regulated by the supply and demand; now, what can the master afford to pay for labour to produce his material for a given price, and to procure a fair remuneration for his capital? No combination can force wages up to an unnatural height for any length of time, because no one will lay out capital unless it be remunerative, and when it fails to be so in one branch of trade we may rest assured that capitalists will seek out other channels to employ their capital. On the other hand, the master should not expect more than a fair remuneration for his capital. Then arises the question, What is a fair remuneration for capital? Here is the gist of the matter. If masters and men could agree about this matter more than half their disputes would be adjusted. The masters and men—capital and labour—are dependent on each other; the interest of the one should be made the interest of the other. Then if each could be made to feel that their interests were blended together there would be confidence, and without confidence nothing can go on smooth. As matters stand at present there seems to be a want of confidence, in a great measure, between masters and men, the men supposing that the masters are ever ready to pay them less than their labour is really worth, while the masters are always distrustful that the men wish to extract more than their labour is really worth.

We really hope that some principle will be adopted satisfactory both to men and masters. It must, however, be a very broad principle that will apply to a variety of cases. Supposing, for instance, it should be decided that the master should pay wages at such a rate that he could produce his material for market price, and get 6 per cent. for his outlay. How inconvenient this would be. The price of the material may drop or rise once or twice during a month, and the wages of the workmen would have to be lowered or raised accordingly. And as it takes far more capital to open out some works than others, the rate of wages would necessarily vary in every work. Some have suggested to make a half-yearly or yearly account; and after the percentage of the master has been taken out of the profits, to share the remainder equitably between masters and men. Whatever principle be adopted, we hope it will prove satisfactory. I thank "A Man of Experience" for his letters, and hope he will discuss the matter fully. SAMUEL JENKINS.

SMOKE-CONSUMING APPARATUS OF A. THIERRY SONS AND CO., PARIS.

SIR,—At the South Wales Institute of Engineers' last general meeting, reported in the Supplement to the Journal of Aug. 15, Mr. R. Bedlington (President of the society), in the course of his excellent address, stated that the question of the best result to be derived from the use of coal being not yet solved, there was not sufficient economy displayed in the use of coal in Wales; that the subject should be further treated, and that their engineers should give attention to the form of boilers, and to the better consumption of smoke.

Thierry's smoke-consuming apparatus, so well known to all engineers, has of late been subjected to great improvements, and by a widely-extended application has demonstrated that, by the use of a jet of superheated steam injected on to the burning coals, it not only produces a complete consumption of smoke, but even permits us to use coal of inferior quality, and to diminish nearly by one-half the area of the grate, with an increase in the production of steam. The complete and economical combustion of the smoke is thus obtained by the total transformation of the fuel into carbonic acid and steam, without a loss of heat being caused by the introduction of a quantity of air into the furnace, whereby the oxygen is prevented altogether from combining with the carbon contained in the smoke. To obtain this result, and to render impossible the formation of carbonic oxide gas, a sufficient quantity of air must pass through the mass of combustible, and the surface of the coal must be at the same time violently blown upon.

By virtue of a second treaty entered into between M. Thierry and the French Minister of Marine, approved of by M. Dupuy de Lôme, Director of the Naval *Materiel* and Constructions, &c., and accepted by the Administrative Council of the Port of Cherbourg, this smoke-consuming apparatus was applied to boilers at the Napoleon basin with the following results, the experiments having been made during a lapse of *fifteen months*:—

1.—That Thierry's apparatus is simple, easily managed, and unattended with danger.

2.—That it increases the draught and the activity of combustion, and allows *inferior coal* to be used with advantage.

3.—The gases being entirely consumed, *the combustion of the smoke is perfect*.

According to the report of two experiments by MM. Silbermann and Tresca upon the steam generators of the Napoleon Basin, Cherbourg, we have—

	Without Thierry's apparatus.		With Thierry's.
Coal expended	Kilos. 1850	.....	Kilos. 1770
Cinders.....	540	.....	348
Mean ordinates of the diagrams ..	11·03	.....	11·15
Water evaporated per kilo. of fuel.	8500	.....	9273

Without the apparatus, the work performed (proportional to the number of strokes multiplied by the mean ordinate) is $12,365 \times 11{\cdot}03 = 13,639$, for a consumption of 1850 kilos. of fuel, or 7·37 per kilogramme. With Thierry's apparatus the useful effect was $13,480 \times 11{\cdot}15 = 15,032$ for a consumption of 1770 kilogrammes of coal, or 8·43 per kilogramme. Therefore, the relative economy resulting from the use of the apparatus is about 13 per cent.

Experiments made at the Ecole Impérial Centrale showed that a jet of 5 holes of 2 millim., applied to a 10-horse power boiler, with a pressure of 5·7 atmospheres, expends per hour 24·8 kilos. of steam, or 248 kilos. per day of 10 hours. Taking the average of 8 kilos. of steam per kilogramme of coal, there are 31 kilos. of coal used in consuming the smoke, and this is compensated by the increase of caloric produced by the steam-jet. Comparative analyses of the escaping gases from a steam-boiler furnace, with and without the apparatus, show that whilst from 2 to 3½ per cent. escapes as carbonic oxide, hydrogen, and carburetted hydrogen from the ordinary furnaces, nothing escapes when the apparatus is used but oxygen, nitrogen, and carbonic acid. It is estimated that 8·080 metric units of heat are produced with the apparatus and 2·475 without it = 5·607 metric units in favour of the apparatus, thus showing that the air necessary for combustion can, in even the best constructed ordinary furnaces, be mixed with the products discharged into the atmosphere, and pass through the furnace without producing any other effect than to carry off a quantity of heat at the expense of the boiler evaporation. Air introduced by the draught, and circulating in the flues, to escape by the chimney, is a fluid vein, acting under a well-established law. Under the action of the forces producing its movement, the gaseous particles constantly tend to follow the shortest route to attain the end of their journey, whence it follows that the gaseous streams follow parallel lines. This being the case—and it has been confirmed by chemical analysis—it may so happen that the fillets of combustible gases and particles of carbon, chemically sub-divided, travel in a parallel direction beside the oxygen, capable of inflaming them, but which fails to do so for want of contact and consequent reaction.

Mr. Thierry's apparatus acts in a manner so as to break up the parallelism of the threads of combustible gases and of the air, which which can burn them chemically; thus, in the midst of the gaseous mass a violent stirring up takes place, which brings the combustible in contact with the molecule of oxygen capable of transforming it. One of the great advantages of this system of smoke consumption is that it can be adapted in 12 hours to all boiler furnaces, stationary or locomotive, also to all steam generators and fire hearths used in the arts or manufactures, blast, puddling, melting, and reverbatory furnaces, and to boilers heated by the gases from blast-furnaces, without it being necessary to make any alteration whatever in their present disposition.

The Commission appointed to institute comparative trials on board the Var sloop of war, at Cherbourg Arsenal, working with 60 to 120 centimetres of mercury, rendered a very favourable report on this apparatus.—1. The consumption of smoke was perfect with Newcastle coal.—2. A greater quantity of steam was produced (about 20 per cent.), although the area of the fire-grate was reduced by one-half. —3. A real economy obtained on account of the superiority of the effective dynamic force.—4. Recommend especially the general employment of these apparatus for naval steam-boilers, as well as for land engines.

On board the Imperial yacht, the Jerome Napoleon, after a series of trials made, in a very heavy sea, in presence of Prince Napoleon, Commandant du Buisson reported an economy of 12 to 13 per cent. by the use of M. Thierry's apparatus, complete absence of smoke, a higher rate of speed during all the voyage, and a considerable amelioration in the arduous duties of the engineer and stokers.

After nine years of comparative experiments in the arsenals of the French Imperial Navy, M. Thierry has formed treaties with the following:—The Minister of Marine, for the application of this apparatus to all steam-boilers, on land and sea. With eight railways in France, for whom he has mounted more than 1200 apparatus for passenger and goods engines. More than 500 have been applied in Paris and the departments to different factory boilers. Also, they have been supplied lately to every nation in Europe.

The new company, just formed, for running passengers and goods trains on common roads near Paris have also adopted for their road locomotives Thierry's smoke-consuming apparatus.

M. Ducering, member of the International Jury of 1867 for the smoke-consuming apparatus, while lamenting the wide-spread clouds of black smoke from the Government engines (the Chaillot Water Works, the Tobacco Works, and the Mint), says—and we can bear witness to it by experiments made in our presence—that in the Champ de Mars Thierry's apparatus was the only one which consumed instantaneously the smoke. When the steam-cock is shut a dense smoke arises from the chimneys, but as soon as the jet of steam is introduced into the furnace it ceases, and the fumes pass off colourless into the atmosphere.

The cost of the application of this principle is for *warranted apparatus*, of course modified by extreme cases of application, but the scale of prices, for ordinary calculation, is as follows:—1 to 10-horse power, 20*l.*; 11 to 15, 24*l.*; 10 to 20, 28*l.*; 21 to 30, 32*l.*; 31 to 40, 36*l.*; 41 to 50, 40*l.*; 51 to 60, 48*l.*; 61 to 100, 60*l.* All expenses of mounting and setting up the apparatus are borne by the inventor, but the alteration in the brickwork, &c., is paid for by the manufacturer.—*Paris, Sept.* 8. C. H. D.

SHUNTING GOODS TRAINS ON MAIN LINES OF THE LONDON AND NORTH-WESTERN RAILWAY.

SIR,—Since I addressed you [see *Mining Journal*, Sept. 12] pointing out the danger of shunting or making up goods trains on main lines where there is a large passenger traffic, and proposing the rules printed in your Journal of the 12th inst. for so managing the goods traffic as to keep the main line safe and clear, there have been no less than three collisions on this line between goods and passenger trains, two of them with these very Irish mail trains, and one very dangerous, which might have been a repetition on a smaller scale of the Abergele disaster. All these would have been avoided if the rules I proposed were enforced.

Nothing can make shunting and dividing goods trains on the main line safe. As I pointed out, they must merely use the main line to travel over between goods sidings at the stations, under such regulations as will avoid all danger of running into or being overtaken by passenger trains. All making up and detachment of goods trains must be managed wholly on the side lines in the goods stations, which must be so arranged as to afford ample room and accommodation for this purpose.

The evidence at Abergele of the Inspector sent down by Government to enquire into the accident is wholly worthless, from its feeble puerility. He said that the regulations were as well calculated to ensure safety as the exigencies of the large goods and passenger business allowed. This is the merest trifling with this important subject. Safety is the first consideration, to which all else must be made subordinate. At whatever cost these railways must make their lines such as to avoid all danger of mischief that can be averted by human foresight. Let the public keep their attention on this subject until the rules I have laid down are rigidly enforced by Government regulations. Until this is done we shall continually hear of accidents from this mode of carrying on goods traffic. No regulations short of those I have pointed out can make it safe, and until Government interferes juries must take the matter into their own hands, and mulct the lines heavily for all the damage from this cause to life and limb, wholly dismissing all attempts to throw the blame on some officer or servant for not doing what is often literally impossible.

London, Sept. 23. A MAN OF EXPERIENCE.

DRUIDICAL MENHIRS AND DOLMENS IN INDIA.

SIR,—A very interesting notice will be found in the address of the President opening the British Association meeting, at Norwich, of the existence within 300 miles of Calcutta of these singular erections, exactly corresponding to those in England and Brittany, supposed to be Druidical. It is a strange proof of the utter neglect of all East Indian matters up to our days that this was noticed, with accurate drawings in illustration, by Col. Yule nearly a quarter of a century ago, but without any of the attention the importance of the discovery deserved being paid to his researches in this country at that time. We went on puzzling over Stonehenge, and racking etymology for a solution of the mystery in the old names of the places where these remains were found, when both the name and the very thing yet lived in the East, only waiting to be noticed. I say *lived*, for this singular hill-people, the Khasirs, continue the erection of these monuments to this day, and the word man—Welsh, *maen;* British, *men*—stands with them for *stone*, entering into the names of places, just as in Welsh Penmaenmawr (near the late terrible railway catastrophe) means "the head of the big rock or stone," so Menhir means a *standing stone*—two blocks and an impost, as at Stonehenge—Dolmen is a *table stone*, a slab on four short stones. All these remains and erections (with regular Cromlechs or arrangement of Menhirs, ending in a Dolmen) are exactly the same as found here. We want further information as to the religious use of these singular structures; and, unfortunately, the late visit was in the rainy season, when the process of erection could not be witnessed, though several were seen quite recent, and some are added every year. Thus, the information as to the puzzling problem how such masses of stone were moved by a people destitute of mechanical aids and knowledge is not yet solved, though some interesting information is given on this point, which I think worth notice in your pages. The large stones (some 32 ft. by 15 ft. by 2 ft. 8 in.) are quarried from a mass of sound rock, by cutting grooves in deep lines, along which fires are lighted. Cold water is then suddenly poured into these grooves, riving the heated mass along the groove. All that is told of the process of putting them up is that the only aids to manual force are ropes and levers. The only account given of the purpose of these strange monuments is that they serve for burial, "to mark spots where public events had occurred," &c., which is very vague and unsatisfactory. We may, however, hope that now, when the discovery has attracted the attention it deserves, we shall soon hear more about it. A MAN OF EXPERIENCE.

MINERAL PROPERTIES—CREATION OF MATTER.—No. IX.

"Soon as the evening shades prevail,
The moon takes up the wondrous tale,
And nightly, to the listening earth,
Repeats the story of her birth."—ADDISON.

SIR,—We will now leave the valuation of mineral properties, promising, however, as the subject is important, to return to it after the completion of this series. The works of men, like Cagliostro, who charged a blacksmith of Palermo a considerable sum for showing him to some hidden treasure, seems also to require further explanation. The creation of matter. What is matter? How was it that matter came into existence? By what means have we gained our knowledge of the manner by which it came into existence? These questions, and others that may be suggested, seem to be legitimate researches for an intellectual being like man, endowed as he is with a reasoning power, capable of tracing effects to their causes, and secondary causes to primary causes. A distinction, however, should be made between what is fact, derived from the laws of Nature, and speculative ideas, or something supposed to exist, of which there is no demonstrative proof. True science knows nothing of these. As we have stated before, true science deals with hard facts; from those facts deducts principles; and upon those principles builds up its magnificent fabric, immutable as eternity itself. The distinction between actual fact and supposition must be kept in our search after truth, else we shall soon be led into an inextricable labyrinth. One author has made the following distinction:—*Knowledge* is acquaintance, however gained, with facts; *learning*, the knowledge derived from facts of high literary merit; *wisdom*, the just application of knowledge—knowledge in action; *science*, knowledge of the laws of Nature. Hence, how beautiful are Gay's lines—

"But he who studies Nature's laws,
From certain truth his maxim draws."

Nature is, indeed, "beauty to the eye, and music to the ear; she charms the heart, and thrills the imagination."

Everyone admits that an effect must have a cause somewhere; and that there is nothing to be seen on the face of our globe, or in its dark recesses, or in the sea, with its innumerable population of every size and shape, but that has an adequate cause. There is not an atom of matter throughout the universe, in the almost boundless space, with its myraid worlds, but what was called into existence by a power vastly superior to itself. The chemist can trace matter back to an atom, and leaves it there; the philosopher takes us back to the first natural point, which is much further back than the atom. The chemist tells us that if we give him some 69 primary elements, he will then be able to give us every known substance; while the philosopher gives us full assurance that if we grant him his first natural point, together with certain conditions for his point, he can then, with the greatest facility, give us a globe. Like Archimedes, with his lever, he could move the world, if he had another world for a fulcrum. But where is the chemist to obtain his 69 elements from? Or even supposing that all matter can be traced to the four gases—hydrogen, nitrogen, oxygen, and carbonic acid gas—which some think may ultimately be done, the same difficulty will arise as to how they are to be got, without admitting a FIRST GREAT CAUSE, who by His fiat commanded them to exist. This First Great Cause must of necessity be infinite, self-existent, above the comprehension of finite man, and far above the laws of geometry to measure His capacity, or of metaphysics to fathom His mind. We cannot tell His length, breadth, height, &c., neither can we conceive the workings of His mind; to us these things are, and must for ever be, incomprehensible. Yet we are forced to the belief that such a Being must exist, before the primary elements of matter could possibly have existed; and however much matter may have been modified afterwards, He must have been either the direct cause, or else He imparted to matter an occult power, in obedience to which the modifications were effected. We must, however, guard less we fall into the Epicurean doctrine, and ascribe too much to Nature, and too little to the Deity. Whatever laws govern the universe, they all received their impetus from the First Great Cause. It would, perhaps, not be unprofitable to take a glance—a very cursory one it must need be—at the manner by which different nations accounted for the creation of matter. The cosmogony of several of the ancients appears to us at this time unreasonable, yet we can glean something from everyone; if nothing else, we can thereby read the gradual development of the human mind on this subject:—

"1.—The Egyptians hold that heaven and earth at first were mixed together, and afterwards the elements separated, when the air began to vibrate. The fiery element, being the lightest, raised itself up, while earth mixed with water, being heavier, fell down. By continual velocity, the water separated and formed the sea, and then dry land appeared. After the earth felt the warmth of the sun different creatures were formed, inhabiting the dry land, in water, and air, according as they were adapted. Ultimately, when the earth was hardened by the sun and wind, it could no longer produce creatures of itself, consequently they propagated their species."—Wilkinson's Ancient Egyptians, as quoted from the "Encycloplædia Cambrensl," 2d vol., page 508.

"2.—The Phœnicians believe that the first principle of creation is air and chaos. The Great Spirit, having regard to his own principles, began to wish and to mix, and this was the beginning of everything. By this mixture mot or slit was formed. From this slit creatures were formed of the shape of an egg. After this the stars began to shine. Then the air, becoming warmed by the heat of the sun, winds and clouds began to be formed; then the thunder awakes the creatures that were created before, and they began to move—male and female, on the land and in the sea."—*Ibid.*

"3.—The Babylonian cosmogony is as follows:—There was a time when there was nought but water and darkness everywhere, containing several large creatures. The whole was governed by a female called Homoroka, of which the sea is a symbol. Bel, the Supreme God, separated the darkness, and he divided the woman into two parts, of which he made heaven and earth. Bel afterwards cut off his own head, and from earth, mixed with blood, he made men, consequently men were endowed with supreme understanding."—*Ibid.*

"4.—The Indians have several forms of cosmogony, the oldest of which is given by Menu. Menu was an Hindoo legislator; he is considered as the son of Brahma, and the first created man. Menu teaches that everything in the beginning was darkness. The world now existed only in the Divine determination. Water was first created, and contained the seeds of life; the water became an egg, from which Brahma, the creating power, came out, who divided his own person, and became male and female. The water is called *hâra*, or the spirit of God; it is also called *hâragana*, or motion on the surface of the waters."—*Ibid.*

"5.—According to the tradition of the Etrurians, God created the heaven and earth during the first thousand years; the atmosphere during the second; the sea during the third; the sun, moon, and stars during the fourth; the creatures that inhabit the air, sea, and land during the fifth; and man during the sixth. The earth is supposed to be 12,000 years old, of which man has inhabited it for 6000 years. The traditions of the Persians are similar. Ormuzyd created the material universe through his word in six epochs; in the first epoch he created the heaven and earth; in the sixth he created man. At the end of every epoch Ormuzyd held a festival for the heavenly inhabitants."—*Ibid.*

These are the principal cosmogonies. We see some truth in each one. In the Egyptian we see that the heat of the sun is the cause of animal and vegetable life. In the Phœnician we see the cause of wind, rarified air, which science has declared to be the case. The Babylonian appears to be the most unintelligible, because if Bel could cut off his head he must be finite, and in all such things the head is the source of life. The Egyptians, Phœnicians, and Babylonians defied matter, while the rest explain the creation of matter as an emanation from the Deity, as light emanates from the sun, not according to His will, but of necessity. We look in vain, however, in these for the gradual development of life that the Bible and geology teach us has been the case; and we also look in vain to these for the great fact that the earth has been gradually fitted up, as a magnificent palace, for the reception of its great master, Man. During the long, long ages since matter was first created till the creation of man, every metal and mineral were formed that could conduce to the comfort of man, while rocks were disintegrated by water, air, and other influences, so as to be capable of sustaining vegetable life. It was left to geology—the index and chronomoter of the Almighty—to bring these to light.

By this time we also know that the antiquated notion of the four primary elements—air, water, earth, and fire, is erroneous, as neither of these is a simple element, but compound ones. Air we know is a compound of two gases—nitrogen and oxygen; water is a compound of two gases—hydrogen and oxygen; earths, as seen on the surface, vary greatly in their composition, such as silica, alumina, &c.; while fire has been proved within the last century to be no substance or element at all, only a combination of circumstances—the carbon of the fuel unites with the oxygen of the air, thereby causing heat, and emitting carbonic acid gas.

The teachings of geology also are decidedly opposed to the teachings of Spinoza, who taught that matter is eternal, and that the uni-

verse is God. As Sir Charles Lyell says, we can prove that man, and all the species of animals that are contemporaneous with him, have had a beginning; the animals also that existed before him had a beginning, consequently the earth, as it now is, could not have existed from eternity, as some philosophers will have us believe. Whewell also argues that the resisting medium that has been found to exist in space will slowly, but for a certainty, ultimately cause confusion in the heavenly bodies. They will come into each others track; therefore, they must have had a beginning. Dr. Hitchcock says that, perhaps, geology cannot disprove the eternity of matter, but it can point to certain conditions in which our globe has been in which animal or vegetable life could not exist, and challenges the advocates of the eternity of matter to account for the existence of animal and vegetable life without calling in creative power. Therefore, if creative power were necessary and exercised at one time, it is difficult to see why it may not be exercised at another. SAMUEL JENKINS.

[To be continued in next week's Journal.]

INVESTMENT IN COAL AND SLATE PROPERTIES.

SIR,—I have been much gratified by the plain statement of Mr. S. Jenkins, respecting his mode of estimating the value which should be paid down for investiture in coal or slate quarries—that is, if their capabilities of profitable produce are equal to his estimation of fair workings. I have tried each, and find a profit of 9 per cent. per annum on his basis for coal, and 11 per cent. per annum on his basis for slate. In each case Mr. Jenkins represents the value may be stated at two-thirds the gross working profits for the purchase-money. An exception will be found in Diffwys Quarry. Working the slates (say) for a period of 20 years, producing 267,000 marketable slates, at a clear profit of 15s. per 1000, supposing 200,000*l.* to be the amount paid down, which would realise about 7½ per cent. per annum on investment money; but if the slates were worked out at Diffwys in 14 years, producing only 188,000 slates, then the purchase value should have been only 140,000*l.*, which would have repaid nearly 11 per cent. per annum. W. AUSTIN, C.E.

85, *St. George's-road, Southwark, London, Sept.* 21.

THE PROSPECTS OF COPPER MINING.

SIR,—It is fortunate there was a rise and not a drop in the standard for copper, as a further fall would be ruinous to the deep mines, not only in Devon and Cornwall, but in every part of the world. Copper, except in young or new mines, cannot pay the working charges at the present price of the article. For example, the Clifford Amalgamated Mines, now forming a compact of three of the greatest mines ever discovered in Cornwall; 20 years ago these mines were paying—the Great Consolidated and the United Mines—immense profits previous to the discovery of Wheal Clifford, and were yielding about 3000 tons of copper ore per month, averaging at least 40 per cent. above the present assay of the Clifford ores; with this difference in the produce per cent. of metal, the secret of the present mines not paying profits as formerly is accounted for. These remarks equally apply to the Cobre Mines, in Cuba, the Burra Mine, in Australia, the Bruce Mine, in Canada, and all the deep mines in every part of the world. Our ancestors knew the secret of discovering new mines by driving day, or adit levels; the present generation appears to be all at sea. They who speculate invariably wait until a fresh fever occurs in the speculative world, and then rush pell mell into all and every wild speculation that may be started, whether it is in the shape of forming companies to re-open old and exhausted mines, or the entering into some finance bubble or other, under some new adopted name, borrowed from a foreign state. When will men open their eyes to common sense, and embark their capital in sound and legitimate pursuits? The greatest and richest mines ever known have taken three, five, or seven years to open out in a mercantile and profitable manner. At the present time, persons embark in mines just as the enterprising boy did with the goose and the golden eggs. A MINER.

ST. JOHN DEL REY MINE—RECENT EARTHQUAKES.

SIR,—The late terrible news of the volcanic effects that have recently taken place on the coast of South America, can leave but little doubt as to the cause of the calamitous fire that took place in the St. John del Rey Mine some time since. That the sad conflagration arose from physical causes there can be little doubt, and not, as was reported, by incendiaries, for the purpose of spiting the manager. It must be (one would suppose to anyone who understands anything of such matters) next to impossible to intentionally set fire to a gold mine, the timber of which being saturated with damp, could not be easily ignited; and should one portion of the mine be so fired, it would not readily spread, nor could any miscreant do such an act without being detected by his fellow-workmen.

That the extraordinary volcanic actions which have been going on for many months past on the earth's crust was the cause of that calamitous fire will be found to be the case, there can be but little doubt, if the old workings are at any future time cleared out. There is ample evidence that these subterranean commotions have been extensively going on in various latitudes. About two months since I had a letter from a gentleman, then at Denver, Colorado, who had been in the southern part of California, and was then travelling from the Pacific Coast eastward, in which he informed me that there had been evidences of some great submarine disturbances, by the fact that there had been several heavy volcanic waves, which came on shore some time previously to his leaving the West Coast, in the neighbourhoods of Santa Cruz and San Diego, and had broken upon the land from 50 to 60 feet above the highest tidal wave-line, and had receded with the same effect, doing a great deal of damage.

I have now information of another earthquake having visited the mines of Nevada as late as July last. My informant tells me that the shocks were felt all through the mines in the neighbourhood of Virginia City, but most severely in the workings connected with the Bullion Mine, that being the deepest mine in that district (1200 feet below the surface). On the first shock being felt, the underground engineer hastened to descend, and found all the men in consternation, preparing to quit the workings as fast as possible; and while he was in the drift a second shock took place, the effect of which he describes as though everything in the mine was being violently pushed from east to west. Although the motion appears to have been great, yet it is highly gratifying to find that there has not been any damage to life or property.—*Ramsgate, Sept.* 23. J. B.

MINING IN CORNWALL.

SIR,—Having an interest in West Chiverton and other lead mines in its neighbourhood, I was induced to visit Cornwall, for the first time, this summer, and must say if shareholders would only follow my example, much of the dissatisfaction so often expressed at the delay in meeting with riches would be removed. Then adventurers would see for themselves the vast amount of work there is to be done before the wealth sought after is arrived at, and how by patience and confidence in the agents alone can mining be carried on to a successful issue.

WEST CHIVERTON is an example—worked by one party, and abandoned, taken up by another, who, on the eve of realising an enormous fortune, sell it to the present company for 30,000*l.* They, in their turn, have reaped the reward of patience and outlay by securing to themselves the richest mine in Cornwall. A visit to this far-famed property would well repay the trouble of the journey.

Whilst here I went over CHIVERTON MOOR, which holds out prospects of success at no very distant day. The bottom of the mine, I was informed by the agent, was gradually improving. The 75 west is producing some rich stones of lead, some of which were to be seen on the mine.

I also paid a visit to GREAT SOUTH CHIVERTON, and was much pleased with the property. The agent met me with a great deal of courtesy, answering my questions, and giving me every information. Some fine rocks of solid lead are now being raised from the 40, several large piles of this mineral being at surface. Capt. George informed me they were in daily expectation of cutting a rich lode in the 50. Here is another instance of legitimate mining. For five years the shareholders have steadily persevered, paying calls, erecting steam-engine, sinking shafts, and laying open a mine which now holds out hopes of a success equal to that of its rich neighbour, West Chiverton.

Returning homewards, I visited some of the mines on the banks of the winding and beautiful Tamar. This neighbourhood is famous from the fact of the redoubtable Sir James Drake having partly paid the men of his fleet from the proceeds of the silver lead mines in this district. I was much interested with the TAMAR VALLEY MINE, which is situated and opposite the romantic town of Calstock, on the Devonshire side, and much pleased with some fine specimens of lead ore lying at surface. They have a fine engine in course of erection for the purpose of working the mine. Many years since this mine had its own smelting works, proving that large quantities of lead must have been raised. Lead ore in those times realised from 8*l.* to 9*l.* per ton only, whilst now it will fetch from 25*l.* to 30*l.* per ton, owing to the improved method in dressing it for silver. The agent is very sanguine of success, and he assured me the mine would make good profits as soon as they got the engine to work, which is expected by the early part of October. I would advise all interested in Cornish mines to visit them during the summer vacation, and I am quite convinced they would be well repaid, and not regret the advice given by a— SPECULATOR.

Sept. 23.

THE CLIFFORD MINES, AND THEIR MANAGEMENT.

SIR,—The adventurers in Clifford Mines have this week received through the committee a report, dated Sept. 19, from their energetic manager, Capt. John Nicholls, who appears to be "the right man in the right place," of the progress made at the mines since the account meeting, held on Aug. 19, and from which it is very satisfactory to find that he has succeeded in thoroughly ventilating the *hot end* in the 240, at Frances, so that the men can now work there in perfect comfort, and that he is also now engaged in doing the same for the *hot level* in the 235 at Clifford, which will enable the men to increase driving and sinking in that portion of the mines, and thus open the ore ground much faster than has hitherto been done. The committee remark that Capt. Nicholls's report of this day cannot but be deemed very encouraging, and they fully hope, from recent improvements which have taken place at Davey's and Frances, that the mines will resume paying costs sooner than was anticipated, and will again become profitable. Capt. Nicholls reports—

CLIFFORD: The lode in Davey's shaft will yield 5 tons of ore per fm. In the 235 west the lode is worth fully 6 tons of ore per fm. for the part being carried; there is still some lode standing south, and from the general appearance of the lode in the end, coupled with the water decreasing in the 224, I am of opinion we shall soon be in a position to increase our samplings.

FRANCES: In the 240 west the lode where cut into is looking well. The water is increasing, and I expect the winze in bottom of the 230 will soon be drained; this winze is worth fully 10 tons of ore per fm., and will, I hope, soon be communicated to the 240. He concludes his report by saying—

"From the above remarks you will see we are now on the eve of draining the great extent of valuable *ore* ground at Clifford, what will enable us to sample an increased quantity of *better quality* ore, and having a good lode at Frances, together with the ore we shall in future have from Garland's stopes, I consider our future prospects very good, and as I have before stated, I feel confident these mines will soon be in a much better position." A SHAREHOLDER.

Sept. 22.

NORTH ROSKEAR MINE, AND ITS MANAGEMENT.

SIR,—Anyone looking at the report of this meeting, which appeared in last week's Journal, must at once see that, to know anything of the matter properly, something more than such a one-sided statement is necessary. The North Roskear shares, like those of many other public companies, occasionally change hands, and it is a well-known fact that the Cornish shareholders have to a very great extent sold out. That not more than one-seventh of the shares are now held in Cornwall, and those principally in the hands of merchants, who retain them, as is generally supposed, for the sake of sending in supplies. Such being the case, the London shareholders naturally wished for the appointment of a London secretary, at whose office they could at any time refer to the books of the company, and see the weekly reports. This was accordingly done, and a committee of three gentlemen appointed in London, instead of a committee of three in Cornwall. Of the Cornish committee, two were merchants, who supplied the mine with by far the greater portion of the whole of the materials consumed; and the other gentleman, who was not a supplier, but rarely attended. The number of shares held by these merchant committeemen is, I believe, 38 out of the 695 shares into which the company is divided. Whereas the London committee hold more than half the mine, none of them sell mining materials, and consequently have not the pleasure of passing their own bills. But, on the contrary, being *bona fide* shareholders, have to put their hands deeply into their pockets to sustain and resuscitate a mine which has, by bad management and a most extravagant expenditure in plant, which is but little used, been brought to the brink of ruin. I may also add that the present committee are all of them men of business, and although resident in London, have had a long and intimate acquaintance with Cornish mining. With respect to the change in the engineership of the mine, I may say the present committee prefer having engineers who are totally unconnected with any ironfounder, and who maintain a thoroughly independent position; and the abuse lavished on these gentlemen for being guilty of the heinous crime of appointing their own agents is not only uncalled for, but is also extremely impolitic. For if we, as Cornishmen, deny those who find the capital to work our mines the right of private judgment in conducting their own affairs, what probability is there of their continuing the development of our mineral resources? In short, it must be evident to every person possessed of any knowledge of mining that the days are past when people with more money than wit went into mining, by placing their money at the disposal of merchant committees, and of agents who were the mere creatures of these committees; and that if mining is to be resuscitated at all, something better than the present corrupt and rotten system must be introduced. A CORNISHMAN.

NOTES OF A JOURNEY TO WESTERN AMERICA.

SIR,—It having been intimated that a short description of my journey to Idaho might prove interesting to your readers, I have great pleasure in sending you the following, which I shall be pleased at seeing in the *Mining Journal*. I intended when I left home to keep a diary, but my resolution fell through, as most of such resolutions do, so that I must trust entirely to my memory. I did make a few notes the first few days of my voyage to New York, but the sea air made me so intensely lazy that I could do little else than smoke my pipe, and consider what I could best eat for dinner, so as to give the fish the least chance of devouring it immediately afterwards. We had a very pleasant party on board, and managed to pass away and enliven the time by the performance of amateur theatricals and mock trials, the latter of which were made very amusing by the speeches of Mr. Waterhouse Hawkins, the celebrated Professor of Comparative Anatomy. The scenery as you enter New York Harbour has been often described by more imaginative minds and more facile pens than mine, so I will spare your readers an infliction of my descriptive powers in this respect. One must take a sea voyage to experience the exquisite pleasure that the sight of dry land gives after he has seen nothing but sky and water for a week or two. Not so pleasant, however, was the sight of the Custom House officers, who when we landed subjected our boxes to a severe scrutiny, and kept me kicking my heels in the cold, damp Custom House for a couple of hours, until some one should come to appraise a little quinine I unfortunately confessed to have with me. I offered to pay twice the amount of the most exorbitant duty that could be imposed, but they were inexorable, and I was obliged to submit to have my box broken open, and its contents examined. After my troubles in this respect were over, we proceeded from Jersey to the Island of New York by the ferry. The boats are so constructed that they can carry heavy wagons and carriages with their horses across, so that we went to our hotel without getting out of the carriage. The hotel we stayed at was not the best, though very comfortable. They have every convenience; you can buy gloves, hats, trunks, railway tickets, theatre tickets, opera glasses, and can insure your life, and telegraph to any part of the world without going out of the hotel. There is a hairdresser's saloon, too, in connection with the place.

There are, I believe, no cabs in New York similar to ours. They have three modes of conveyance:—1. Carriages drawn by a pair of horses.—2. Omnibuses, similar to ours in London. They have no guard; the driver does his duty. He has a strap fastened to his wrist, by which he opens and shuts the door. The passengers hand him their fare (5 cents) through a little hole in the front before they get out, and of course they are imprisoned until they do pay.—3. Cars drawn by horses running on rails. These cars generally run from the ferries to the other end of the town through one of the avenues.

The next end of the city, the fashionable part, is divided into streets and avenues; the avenues run parallel to the Broadway (a street that runs the whole length of the Island), and is, with Fifth Avenue, the fashionable promenade for ladies, shopping, &c. The streets lie at right angles to the Broadway; these avenues and streets are all numbered as—First Street Second Avenue, and so on the streets on the Broadway side of Fifth Avenue are called East and the other side West, so that one can hardly lose himself. They place the names of the streets on the lamps at the corner of each street, so that at night you can find your way as easily as in the day time.

I visited three of the theatres in New York—Niblos, the French Theatre, and the Olympic. I went first to Niblos Theatre, which is enclosed in the Metropolitan Hotel; it is larger than our Haymarket Theatre, but not so large as Drury Lane. The play was the "White Fawn," which consisted of five scenes, in each of which a ballet is introduced. Some of the dances were most graceful, as well as disgraceful. They certainly outstripped anything I had seen before. The house was crowded to excess. At the doors of the theatre stand men who sell reserved seat tickets at $1½ premium, and unless you reserve a seat there is not much chance of obtaining one. The French Theatre was well attended, and Offenbach's comic opera, La Grande Duchess, was most enjoyable. The Olympic was pretty good, but chiefly depending upon a liberal display of figure for an audience. I arrived on Friday, and on the following Monday, having got rather tired of New York (which, though a very handsome city, does not afford a stranger much amusement), I made up my mind to go and see Niagara, as I thought if I returned to England without having seen the sight of sights I should be set down as a consummate ass. I started at 6.30, and arrived at Buffalo, which is situate on Lake Erie, about 26 miles from Niagara, at 3 o'clock the next afternoon. The sleeping cars are capitally arranged; they are divided into sections, which are partitioned off by a curtain, so as to secure privacy. Each section contains four berths, but by payment of $3 one can secure a whole section to himself. You can also secure a state room for $4. During the day the beds are made up, and form lounges. Each train is supplied with a lavatory, &c., and a filter containing iced water for the use of the passengers. There are hotel cars in connection with some of the trains, where you can obtain anything you like to eat or drink. As I have not tried them I will not give an opinion as to their merits. Buffalo is more like an English country town than any I have yet visited. The suburbs contain many gentlemen's houses, of most picturesque styles of architecture. Most of them are built of wood, painted white or stone-colour, which forms an effective background for the green Venetian shutters with which most of the houses are supplied. From Buffalo I went on to Niagara the same evening. It was out of the season, and most of the large hotels were closed. I had the pleasure of meeting an English friend there quite unexpectedly, and the next day we did the Falls together. We proposed to walk; but no; visitors were *rara aves* at that season, and the guides and car-men had no idea of letting us off very easily. After much discussion, one man offered to take us round in a carriage and pair for $1; this seemed so reasonable that I closed with the offer at once. When we were seated my friend, more accustomed to the ways of the people than I, asked him what he would charge to take us round and show us everything? He said $5; this rather astonished me, we had agreed for $1. Still more was I astonished when we got back, and he showed us a card by which he proved we owed him about $15. I was not, however, quite prepared to submit to this, so I paid him the $5 agreed upon, with a douceur for himself, and he seemed very well satisfied, as well he might be. I was most delighted with the Falls, but have neither space nor ability to give you a description of their wonderous grandeur. One feels as though he can almost comprehend Eternity as he sees the vast mass of water constantly descending and dashing down with a force that seems as though it would compel a path to the very bowels of the earth. I only stopped there one day, and then returned to New York, through part of the Delaware Valley.

I left the following Monday for San Francisco by way of Panama, as the way across the plains would have been horribly difficult, on account of the snow at that season of the year. We left New York on March 22 in the River Queen, one of the Pacific Mail Steamship Company's steamers. The fare to San Francisco, including the railway fare across the Isthmus, is $150 first cabin. The fare had just been greatly reduced in consequence of a strong opposition, and the majority of our passengers are not the most desirable companions. There were, however, some very nice people, and altogether I enjoyed the trip. When we left New York the weather was so extremely cold that I wrapped myself up in my warmest clothing, and was still too cold; and within four days I should have been glad to have stripped to the buff, had decency permitted. After enduring a degree of heat which kept me in a perspiration for five days we arrived at Aspinwall, where we were left to boil for a few hours, and then were taken across the Isthmus to Panama, where we found a steamer waiting to convey us to our journey's end. Aspinwall is a small town, consisting of one principal street, and a few miserable side streets; the road was filled with negro women of every shade, from ebony to yellow ochre; the latter half-breed between negro and Spaniard, some fine handsome women. These woman sell bananas, bread fruit, oranges, pine apples, &c. People say it is the height of imprudence to eat fruit there; but I gormandised frightfully, and did not feel any ill effects; probably I neutralised the effects by a large amount of claret punch. The journey through the Isthmus is very beautiful. They informed me that the dry season made everything appear to be parched, but to my eye, unaccustomed to a tropical forest, the effect of the intense greenness of the foliage was magical; it seemed like fairy land, the palm trees waving in the soft, warm breeze, the cocoa nut laden with fruit, with here and there a giant cactus, whose flower forms a startling contrast with the vivid green of the surrounding foliage. I should hardly have been surprised had I seen a troop of fairies appear in their short dresses and pink tights to complete the scene; but I must hurry on, or I shall quite tire out your readers' patience before I come to Idaho. At Panama we got some glorious Havannah cigars at $12, that were worth smoking. Aspinwall and Panama are free ports, so that there is no duty to pay on cigars or tobacco. I was sorry that I had not time to see much of the town of Panama, as it is an old Spanish town, pregnant with curiosities, old fashioned and un-American. We left Panama on April 1, and in five days arrived at Agapulco, Mexico, where we stayed a few hours to take in provisions. I and some others went on shore (armed), as there is sometimes a pretty rough time between the Mexicans and the passengers. The Mexicans had been fighting amongst themselves a battle, within a mile or so of where we landed, the day before we arrived. We bought a lot of fruit there, which we found most refreshing, and some very drinkable claret at $3 a case (12 bottles). After leaving Agapulco we went on to Mansienello, where we arrived on the afternoon of April 7. There was a pretty bay, and I felt very much inclined to jump over and take a swim, which desire was quickly dispelled by the sight of the immense sharks. Some refuse of meat was thrown overboard, one piece nearly the size of a man. It was perfectly horrible to see the ghost-like monsters turn over on their back and take in the whole mass of flesh at a single gulp, apparently with scarcely an effort.

At night the natives surrounded the ship with canoes, laden with oranges, manna, and other fruits. As the boats skimmed the water they left long streaks of phosphorus, which, combined with the light of the torches which each boat carried, gave the scene and the faces of the natives quite a demoniacal appearance. We sailed for San Francisco the next morning, and arrived several days after due, in consequence of some severe head winds, which did not agree with the stomachs of some of my fellow-passengers. I was greatly disappointed with San Francisco. I expected a smallish town, and I saw a magnificent city. That powerful fairy, Gold, has in 15 years converted a few miserable huts into one of the finest cities in the world, well built and well regulated. It is, however, one of the most dissipated cities in the universe. One of the papers gives a list of all the assignation houses in the place, ostensibly to tell people where *not* to go. They have a sort of cross between a music hall and a theatre, where girls appear in as near a state of nature as it is possible to conceive. One piece represented a slave market filled with females; the merchant purchasing had to strip them, to see what they were like. During the time the performance was progressing these fair maidens (?) come round to the boxes (which are curtained off so as to be private) dressed, or, rather, undressed for their parts. The oyster and larger beer saloons keep open all night, as often, also, do the gambling houses. I went into two or three of the latter under the guidance of a friend; first we knocked at a door, and after being scrutinised closely through a little hole we were finally admitted; there is generally a supper provided, also whisky, &c., of the best quality, all free gratis for nothing. They have some capital hotels—$3 a day including everything, and feed you well. They have some of the fastest trotting horses here in the world; I hired a pair to go about 12 miles, for which they charged me as many dollars. I made some very pleasant friends where I stayed at San Francisco, where I remained about a fortnight. From there I went by steamer to Portland (a town on the Willamette, a tributary of the Columbia river), where I stayed nearly three weeks. It is a very nice quiet town, of about 8000 inhabitants (San Francisco 150,000); I expected to find there bowie knives and revolvers, and found instead accomplished ladies, some of whom play and sing magnificently.

At Portland I soon got to know most of the people who were worth knowing; everyone was very kind, and tried to make my stay enjoyable. I must say they succeeded. There were several Englishmen there, and on May 24 we, of course, celebrated Her Most Gracious Majesty's birthday by many loyal toasts. Our loyalty became at last so great, that as we paraded the streets, loudly declaring that Britons never, never, &c., we were nearly taken into custody. During my visit to Portland I ran over to Fort Vancouver (not Vancouver's Island), which is the principal place for the Russian fur trade. I left Portland on June 1, and went up the River Columbia by steamer to Umatilla, which we reached in two days, sleeping at the Dalles one night. The scenery on this river, especially near the cascades, is considered equal, if not superior, to any in America. It certainly was lovely; each bend brought to view some new style of scenery. At one moment you would see mountain land, covered with trees to the very water's edge. Mountain after mountain, stretching as far as the eye could reach—no inconsiderable distance in this clear atmosphere. Again, in a moment, the scene would change to tall, straight rocks, standing up perpendicularly, entirely segregated from the bank of the river, which had all the appearance of huge columns, hewn by some giant hands. Next, we would see acres and acres of beautiful pasture land, soft and undulating, like our English scenery. Then we would come upon a strip of yellow sand, where miners were at work washing out its gold. These miners are principally Chinamen. They can get about $3 to $4 a day from this work. We stayed one night at Umatilla, and there took the stage, which looked like a mud-cart, with a canvass covering, to go to Boise City, which is a kind of junction for men who are going into any of the mining districts of Idaho. The distance is not quite 300 miles, and it took us three days to do, travelling from about 2 o'clock each morning to 9 at night. I was very tired at the end of the journey, from the jolting I received. We passed through the Indian reservation. We saw some bear and elk the Indians had killed. We were all well armed, but met with no excitement, though both Indians and road agents had been very troublesome about that time. Boise City has about 2000 regular inhabitants, and a floating population of about another 3000. I stayed there two or three days, and then went on to Rocky Bar, a mining town about 15 miles distant from Yuba, and 100 miles from Boise City. The journey took two days and a-half in an open wagon. We started each morning about half-past six, and reached our stopping places about the same time in the evening. We had to ride on horseback part of the way from Boise City to Rocky Bar, and I can tell you that the little narrow paths, about 2 feet wide, on the edge of the mountains, with a nice little drop of some thousand feet, if the horse should miss his footing, was enough to make one squirm, who was unaccustomed to that sort of thing. The most part of my journey was the 15 miles from Rocky Bar to Yuba; it took me from 3 o'clock in the morning to 11·30. We rode about seven miles, three miles over snow, which was hard on the top and soft underneath, so that every few steps the horses would slip through, and come down on their noses. Some of the ravines and ditches we crossed would have made an English fox-hunter look blue. The way we went over was to let go the reins altogether (the saddles were made something like those of our military), and cling hold of the pommel of the saddle, and then lick the horse with a club, and trust to Providence. It's quite wonderful the way the Cayuse (Indian) horses manage to scramble over or through anything and everything.

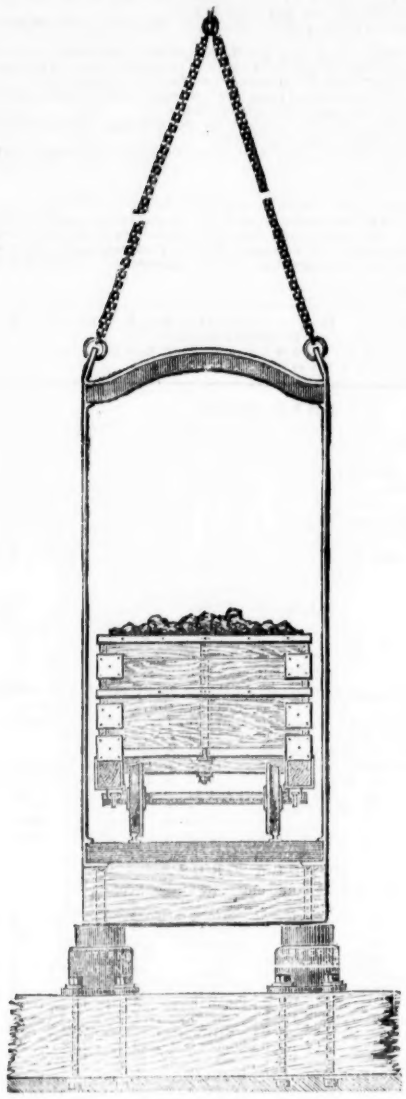
Yuba city is a mining camp situate on a small river of that name, which is a tributary of the Boise river. The county around, which is called the Yuba district, has a more abundant supply of wood and water than any other mining district in the territory of Idaho. There are several very rich mines in the district; amongst the richest are the Atlanta, the ledge of which is from 15 to 25 ft. in width, producing ore which gives most satisfactory results.

I see from the report of Ross Brown to the House of Representatives of the United States that "selected ores from this lode assay as high as $11,000 per ton in silver, and in some places it is equally rich in gold." This mine is being worked by a mill belonging to the Greenback Company. There are several other mines which are thought to be equal in richness and extent. The ore from the first of which, the Lucy Phillips, has assayed on an average from $600 to $900 per ton, and is said to be a continuation of the Atlanta, and equally rich. Next in order come the Lenora, John Bassom, Jessie Benton, Hard Times, Varieties, Sophia Tracey, and Pacific, all of which contain ore of great value. There are many other claims which may prove valuable on further development. Mr. Graham—the pioneer of the country—in co-operation with an English company, has a 20-stamp mill to operate on the Lucy Phillips, the results of which will shortly be known. It is only within a short time that a wagon-road has been opened to this district; it is entirely surrounded by mountains, and the making of the roads has been no small undertaking. Ross Brown says—"From this cause less has been done in this camp, and it has attracted less attention than any other of equal value in the territory. But now that it has become partially accessible, and demonstrated its richness by the working of its ores, it must soon become an important district. I stayed in this place nearly a month; the scenery is very bold and beautiful. The houses are built of logs, plastered with mud in the intevals between the timbers; they are very warm, but the firwood of which the houses are built contains a species of wood tic or bug, that is not at all conducive to one's comfort. There are three or four of the fair sex in the camp, to all of whom I am greatly indebted for much kindness and attention. I have not time at present to write a description of the manners and customs of the Western boys, but I propose to do so when I send you a sketch of my journey back across the plains by way of Salt Lake City.

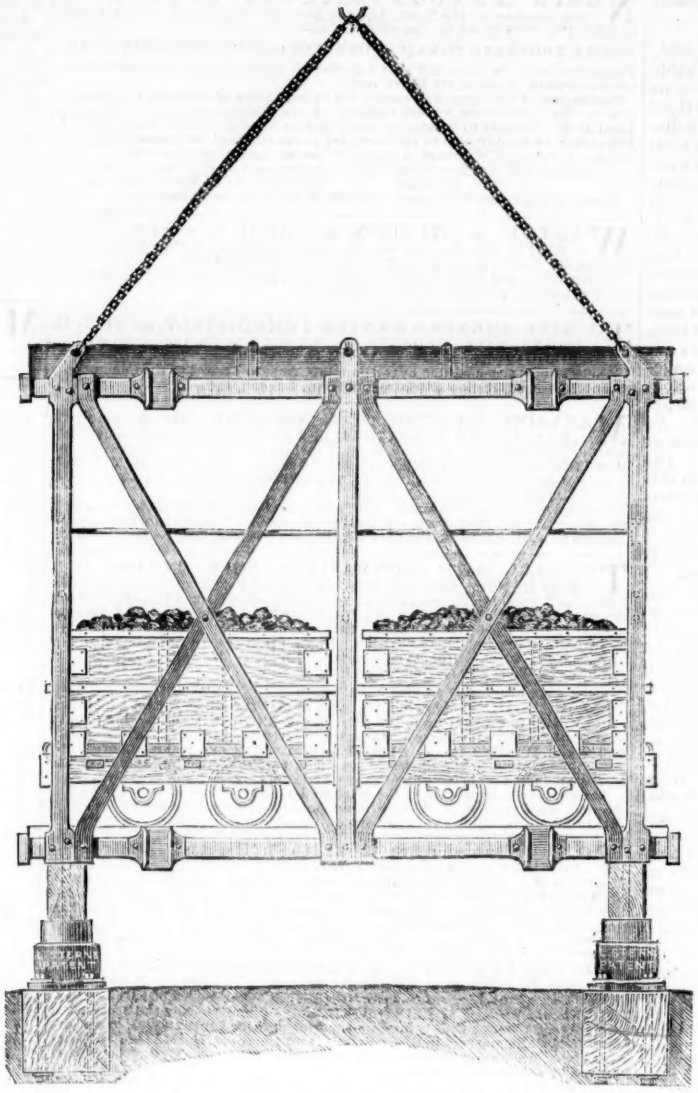
Strand, London, Sept. 8. G. L. HANNAM.

MINING ENTERPRISE.—At an early age Mr. Lemon became one of the managers of the Chyandour Tin-Smelting Works. Whilst in this position, his attention was directed to the great advantages to be derived from using steam-power in pumping water out of mines—an operation which, up to this time, had generally been performed by the aid of horses or mules. He, therefore, entered into a partnership with Mr. George Blewett and Capt. James Dowen, both of Marazion, and took from Lord Godolphin the sett of Wheal Fortune, on a farm usually called Truthwell, situated in the parish of St. Hilary, near the borders of the neighbouring parish of Ludgvan. About this time (April 22, 1724) he married, at Gulval, Miss Isabel Vibert, the descendant of a family of some position at Tolver, in that parish, and by this means he acquired some property, which, being invested in his mining enterprise, laid the foundation of his fortune. In 1720 Mr. Thomas Newcomen came into Cornwall, on the invitation of Mr. Lemon, and in the same year erected for him, at Wheal Fortune, a steam pumping-engine. This was the first engine on this principle seen in Cornwall. Some years previously, however (about 1700), Mr. Thomas Savery had erected a steam-engine, but of a very different construction, at Wheal Vor. Newcomen's engine was so successful in freeing the mine from water that the adventurers were able to work at a great depth, and cut into lodes which previously it had been impossible to explore. The portion of profit which came to Mr. Lemon from working Wheal Fortune is said to be 10,000*l.*—*One and All*, for August.

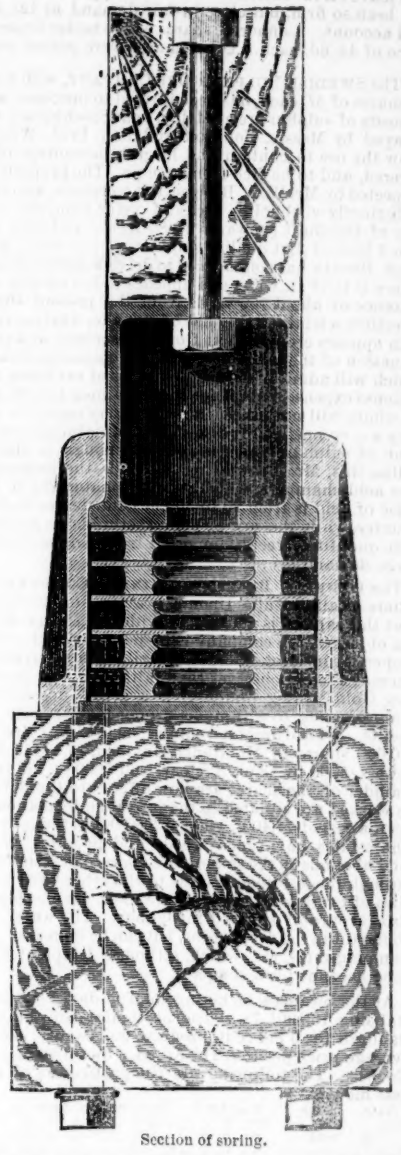
STERNE'S PATENT PNEUMATIC RUBBER SPRINGS, AS ADAPTED TO MINING CAGES.



End view.



Side view.

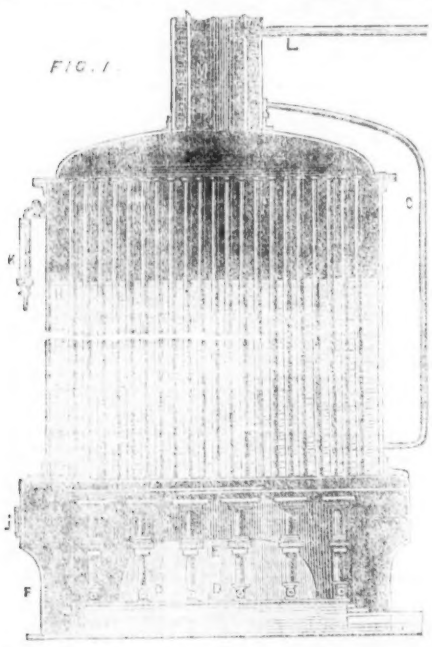


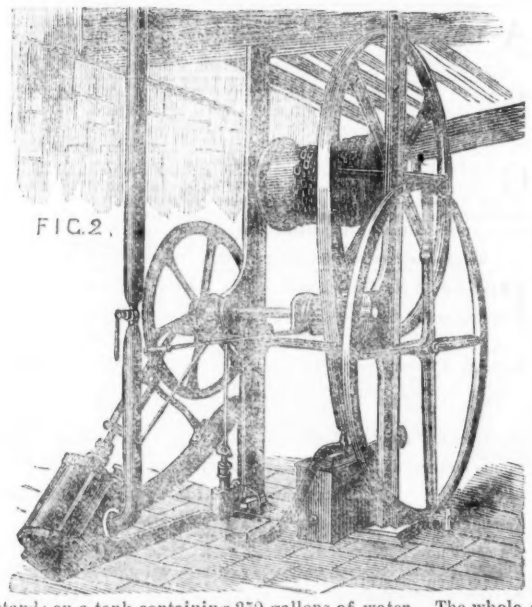
Section of spring.

That mine-cages are subjected to much unnecessary wear and tear through the concussion they have to submit to at the end of each journey is beyond question, yet, in the absence of any compact and efficient arrangement for overcoming the difficulty, colliery managers have been content to regard the evil as one of those inseparable from colliery operations. For some time past the pneumatic rubber springs invented by Mr. STERNE have been extensively used for buffers, draw-springs, and bearing-springs upon most of the principal railways of the kingdom, and they have been severely tested at Mr. KIRKALDY'S experimental works with complete success.

The above illustration shows the application of the pneumatic springs to the cages of mines, the object being to form an elastic platform for the cage to alight upon. They were first introduced at Annesley Colliery, near Nottingham, by Mr. EDWARD HEDLEY, mining engineer, of Derby, with the most satisfactory results, and they are now coming into extensive use in most of our mining districts. The springs can either be arranged as shown in the engraving, or fixed to the bottom of the cage. They are sensitive to a very slight pressure, and yet absorb a power of 15 tons each, being 100 per cent. more than the resisting power of any other spring. They consist of a series of India-rubber rings and Bessemer steel plates, chemically united in the process of vulcanisation; the intermediate plates are of an annular form, and the terminal plates are circular discs, thus making a complete air-tight chamber; this chamber is compressed in proportion to the intensity of the blow or pressure it sustains, and the area of disc upon which the force is exerted.

GENERATION OF STEAM-POWER BY GAS—JACKSON'S PATENT.





The difficulty that has so long operated to prevent the application of steam-power in warehouses, and where valuable goods are stored, owing to the fire insurance offices charging so great an extra premium, is now entirely removed by the system patented by Mr. JACKSON. The engines have been erected in several large warehouses, inspected and allowed by the insurance surveyors, and in every case given the greatest satisfaction. The boiler (which was fully described in the Supplement to the Journal of April 25) is constructed on the vertical multitubular principle, with a heating chamber underneath for the gas-burners, which form a series revolving on a centre joint.

On Tuesday a number of gentlemen met on the premises of the London and St. Katherine's Dock Company, Cutler-street, Houndsditch, to see one of these engines at work; and, as from the large amount of property always stored on those premises ordinary steam-power has never been used, considerable importance was attached to the event of an engine working there. The boiler is of 4-horse power, and is nearly 3 ft. in diameter. It is placed in a small house on a level with the top floor between the A and B warehouses. When all the burners are alight it will raise steam to 50 lbs. pressure from cold water in 25 minutes. Steam being raised to the required point, the burners are extinguished, with the exception of one or two (which are sufficient to keep the gauge stationary), until the power is wanted, when the furnace can be fully lit, and the engine set in motion. The control over the boiler is so instantaneous and perfect that one moment steam may be generating at the rate of 6 or 7 lbs. per minute, and the next the pressure-gauge will remain stationary. The engine, which has a 7-in. cylinder, 18 in. stroke, works direct on to the driving-shaft, which is 85 ft. long, and works four sets of drawing-tackle. It stands on a tank containing 250 gallons of water. The whole of its manufacture and arrangement has been carried out by Mr. T. Middleton, of Loman-street, Southwark, and is finished off beautifully, the engine working in a steady, smooth, and noiseless manner. The lift is 85 ft. from the ground, and upwards of 500 chests of tea are raised per hour.

Mr. Jackson is to be congratulated on the success of his plan, and it cannot be long before his principle is adopted in all our large warehouses, which will prove a great boon to the public, relieving, as it will to a great extent, the inconvenience so often caused by the present tedious slow process of loading and unloading heavy goods in the crowded thoroughfares of not only London, but all our large commercial cities. The testimonials which Mr. Jackson has received speak well for its economy and usefulness.

We attach a drawing of the Boiler (*Fig.* 1), in section, and of the Engine (*Fig.* 2), *adapted* to the crane at the Carron Wharf, Lower East Smithfield, which will show how easily the cylinder, &c., can be attached to cranes already fixed. The boiler is 2-horse power, stands in a corner, and occupies less than 3 feet square.

STEEL AND IRON BOILERS.—Some interesting experiments have recently been made at the Fort Pitt Boiler Works, Pittsburg, U.S., in order practically to test the power of a boiler built of "black diamond" steel by Messrs. CARROLL and SNYDER. The boiler was heated and the hydraulic pump attached, and the intention was to put on pressure enough to burst the boiler, if possible. As the gauge approached 600 lbs. the gasket, or leaden joint by which the man-hole is stopped, began to leak freely, and water also spurted in the form of spray from the seams, until it was found impossible to maintain the pressure. The circumference of the boiler was now found to have increased an inch and a quarter by the stretching of the plates. The leaks mentioned having been partially stopped, three more trials were made, thus more severely testing the boiler by their repetition. By the last of these a pressure of 665 lbs. was reached without producing any further effect than to cause the boiler to swell still more, until it increased 2½ inches in circumference. At a subsequent trial the boiler withstood a pressure of 725 lbs. to the square inch, when, in consequence of the giving way of one of the stay-bolts, further experiments had, for the present, to be abandoned.

THE MINERAL PRODUCTIONS OF THE ZOLLVEREIN.—In 1866 there were 198 gold and silver mines in the Zollverein, employing 10,212 workmen, and producing 641,001 cwts. of gold and silver ore. The greater part of these mines (176) are in Saxony, and produced 598,546 cwts. of ore, which may be valued at $1,267,052. The Prussian mines produced 30,090 cwts. of ore; those of Bavaria, 2850 cwts.; and those of Hainault, 17,515 cwts. The total value of the metals obtained from all the German mines (with the exception of those of Hainault), in 1866, amounted to $1,301,431. The average yearly production from 1861 to 1865 was about 679,039 cwts. In 1867 the gold mines only furnished 310,132 lbs. of ore, valued at $141,791; of this quantity the mines of Prussia and Brunswick furnished 9630 lbs., and those of Saxony 234,502 lbs. The production of silver was more important. In 13 smelting-works, employing 2000 workmen, 157,084 lbs. of silver were obtained.

A MODEL RAILWAY COMPANY.—A correspondent of the *Times* presents a model railway company, whose example other railway companies would do well to follow. "So punctually is time kept by all trains, whether arriving or departing, that a chronometer may be regulated by them every day of the year. Indeed, a gentleman whom I know, and who is well known here, and whose house is near the line, has his eggs for breakfast boiled between the passing of the up and down trains—an interval of three minutes and a half. Not a single passenger by this company's train has been injured during the 28 years it has been at work, and the system of stop signals adopted on it will in all probability prevent any accident occurring." This reads as if the railway spoken of had been projected in Utopia. The line has a real existence, however, and bears the sober Welsh name of "Taff Vale." It is the great coal and mineral line in connection with Cardiff, into which port it brings something like 1000 tons per hour.

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